SHOWCASE PROJECT: TENNESSEE VALLEY AUTHORITY (TVA) — 50001 READY FACILITY

SOLUTION OVERVIEW

Download this Showcase Project

The Tennessee Valley Authority (TVA) provides electricity for 154 local power companies and 54 larger direct served customers reaching 10 million people in parts of seven southeastern states. TVA has actively promoted sustainability externally and internally for decades.

To help residential, commercial and industrial customers save energy, TVA's EnergyRight® program offers guidance, assessments, and incentives. TVA also offers strategic energy management (SEM) training to some of its largest industrial end users. Internally, TVA's EnergyRight® Internal Energy Management Program (IEMP) helps power plants implement a range of building efficiency measures that help meet federal laws that save energy and water as well as directly reduce TVA's annual operations and maintenance cost. These measures focus primarily on lighting, HVAC systems and controls, insulation, and water conservation.

"Energy efficiency deserves a seat at the table with reliability, safety, and the environment. While it cannot compromise those other objectives, energy needs to be part of the business discussion."

Clay Hoover
Program Manager, TVA EnergyRight

TVA's Magnolia plant, which includes 45 buildings and extensive outside equipment, conducts continuous improvement (CI) activities focused on safety, reliability, and environmental performance. Before implementing 50001 Ready, the plant was looking for ways to improve the energy efficiency of its electricity-driven station services (pumps, motors, and other supporting electrical devices).

LOCATION

Benton County, Mississippi

SOLUTIONS

Working with DOE's Advanced Manufacturing Office and Federal Energy Management Program, TVA's EnergyRight® guided the TVA Magnolia plant though the implementation steps outlined by 50001 Ready. The plant kicked off the effort in May 2018. In August of that year the DOE Industrial Assessment Center (IAC) at Tennessee Technological University (TTU) conducted a grant-funded audit of the plant. A team of engineering students and two professors spent two days studying the plant's processes and data. The team came up with a list of promising opportunities to save

energy—many of which required only no-cost changes in operating practices or low-cost improvements. The follow-up IAC report estimated potential savings for each measure, which the plant considered as part of its 50001 Ready process. All solutions implemented through 50001 Ready carefully protected the plant's mission to safely deliver reliable power to its customers while minimizing impacts on the environment.

TVA staff report that 50001 Ready helped its Magnolia plant consider the importance of energy efficiency without compromising energy reliability, safety, and environmental performance. Business decisions are increasingly considering impacts on energy efficiency—without compromising the other three pillars. **The Magnolia plant was able to save approximately 18 gigawatt hours of energy and nearly $1.2 million cumulatively since May 2018—with no capital investment.**

Implementing 50001 Ready

- **Corporate Buy-in**: TVA is working with its customers and leveraging 50001 Ready to seek energy efficiency in their SEM programs and TVA leadership supports the endeavor at its own sites. The effort may have required more engineering time than initially anticipated, but the benefits in energy performance, savings, and leadership are compelling.
- **Energy Team**: The monthly energy team meetings helped raise the profile of energy efficiency across the company. Over time, more people from various divisions started joining these meetings just to see what it was all about, and it was a great way to bring people together toward a common goal.
- **Training:** IAC program coordinator Michelle Davis provided introductory training for the plant. Her experience with ISO methods helped set the plant in the right direction.
- **Opportunities:** The IAC audit and further analyses as part of 50001 Ready identified several no-cost opportunities to save energy simply by turning off equipment when not in use, using the most energy-efficient pumps first, trimming impellers, and using variable-frequency drives (VFDs). These measures applied to 1,000 horsepower pump motors and 3,000 horsepower worth of cooling fan motors can generate significant savings.
- **Keys to Success**: 50001 Ready provided a formalized process for elevating the staff's energy awareness and engagement. Staff members who operate some of the plant's most significant energy use (SEU) equipment, particularly the cooling towers, invested in optimizing equipment efficiency. They were given all the relevant data and information available and were then encouraged to use their expertise to improve efficiency while preserving reliability.
- **EnMS Implementation**: It took the team 18 months to establish their energy management system, dedicating two days each month towards this effort. The plant manager, site engineer, operations manager and corporate engineering representatives with occasional support from top management comprised Magnolia's core team. Monthly calls were conducted and attended by approximately ten individuals from multiple divisions. Top management support paired with this methodical approach infused accountability and sustained momentum across the organization in support of a robust EnMS program.

OTHER BENEFITS

TVA EnergyRight, by utilizing 50001 Ready, helped this plant engage equipment operators in finding

new ways to improve efficiency. (Heat rates, a common metric of power plant energy efficiency, had proven ineffective at staff engagement—largely because key factors (like demand) are beyond operator control.) Energy has earned a spot in purchasing decisions, the plant staff is actively engaged in finding additional energy savings, and TVA is now working to develop a plan to launch 50001 Ready in a cohort of TVA power plants.

Annual Energy Use	Annual Energy Cost
Energy Savings	**Cost Savings**

Magnolia Combined Cycle Plant in Benton County. Photo Credit: Tennessee Valley Authority

TVA Magnolia Energy Team Members. Photo credit: Debbie Murray, TVA

Tennessee Tech University IAC Energy Audit Team. Photo credit: Dr. Ethan Languri, Tennessee Tech University

Dr. Glen Cunningham, Tennessee Tech University and graduate student Billy Alston performing ultrasonic flow measurements. Photo credit: Dr. Ethan Languri, Tennessee Tech University